The goals of the study described herein were to characterize the food web for larval striped bass and other young finfish species in the lower Roanoke River and western Albemarle Sound, North Carolina, and to ascertain if food chain interruption may be a factor contributing to poor recruitment. The objectives of this study were: 1) to determine the relative abundance and distribution of major larval fish species in the lower Roanoke River and western Albemarle Sound; 2) to determine the type and number of prey organisms ingested by these young fish species; 3) to determine the relationships existing between larval fishes and zooplankton; and 4) to determine differences in feeding success between striped bass larvae and other larval fishes. Results of portions of these aspects, especially feeding success of larval striped bass and white perch, were documented by Rulifson (1984a, 1984b), Rulifson and Stanley (1985), Rulifson et al. (1986a, 1986b, 1988), Manooch and Rulifson (1989), and Rulifson and Manooch (1990a, 1990b, 1991, 1993). Large portions of the text described herein, especially the site description and description of river flow, water quality, and zooplankton, were compiled and written originally for a long-term study (Rulifson et al. 1992a, 199b), but are reiterated to provide a detailed context for interpretation of the new information presented in the current study. One of the most important environmental components is river flow. At the present time, U.S. Geological Survey (USGS) personnel are in the process of describing flow patterns of the lower Roanoke River and western Albemarle Sound using mathematical models (Bales et al. 1993). Their studies are not complete at this time, so we have used the flow records from the USGS gage at Roanoke Rapids. Complete data sets for water quality, chlorophyll, phytoplankton, zooplankton, and larval fish are presented in Volume II of this report.

STUDY SITE DESCRIPTION

The Roanoke River and surrounding lands form an extensive bottomland hardwood floodplain in northeastern North Carolina. From its headwaters in the Blue Ridge mountains of Virginia, the Roanoke River drains 25,035 km^2 in Virginia and North Carolina, where it discharges into the extreme western end of Albemarle Sound (Figure 1) making it the largest basin of any North Carolina estuary (Giese et al. 1985). Between 1950 and 1963, a series of dams was constructed near the North Carolina-Virginia border for hydroelectric power and flood control. The most upstream of these impoundments is John H. Kerr Reservoir at RM 179, which is maintained by the U.S. Army Corps of Engineers (Corps) for flood control, hydroelectric production, and recreation. Kerr Dam was completed in 1952; its closure resulted in the landlocking of a portion of the Roanoke striped bass population which now spawn in several tributary rivers. Construction of Roanoke Rapids Dam (the most downstream facility) at RM 137 in 1955 blocked access to the remaining spawning grounds (McCoy 1959). Gaston Dam, located between Kerr and Roanoke Rapids dams, was completed in 1963. Both Gaston and Roanoke Rapids are maintained by Virginia Power Company for electric power production. The Federal Energy Regulatory Commission (FERC) license for both Gaston and Roanoke Rapids facilities expires in 2001, so at the present time the company is conducting pre-application studies of the area. Of the three facilities, Kerr Reservoir is the most important to the lower river and Albemarle Sound because of its storage capacity and direct influence on the operation of the two